May 7, 2003

U.S. Nuclear Regulatory Commission 10 CFR 50.73
ATTN: Document Control Desk
Washington, D.C. 20555

Gentlemen:

TENNESSEE VALLEY AUTHORITY - SEQUOYAH NUCLEAR PLANT UNIT 2 - DOCKET NO. 50-328 - FACILITY OPERATING LICENSE DPR-79 - LICENSEE EVENT REPORT (LER) 50-328/2003-004-00

The enclosed report provides details concerning an automatic reactor trip resulting from a low condensate pressure. This occurred upon loss of a hotwell pump coincident with the No. 7 heater drain tank outlet valve. The valve was secured in the open position and a failure to perform a Technical Specification required action within the required frequency. This event is being reported, in accordance with 10 CFR 50.73(a)(2)(iv), as an event that resulted in an automatic actuation of the reactor protection system, and 10 CFR 50.73(a)(2)(i)(B), as any operation or condition which was prohibited by Technical Specification.

This letter is being sent in accordance with NRC RIS 2001-05.

Sincerely,

Original signed by

Richard T. Purcell

Enclosure
cc: See page 2

cc (Enclosure):
Mr. Michael Marshall, Senior Project Manager
U.S. Nuclear Regulatory Commission
MS 0-8G9
One White Flint North
11555 Rockville Pike
Rockville, Maryland 20852-2739

INPO Records Center
Institute of Nuclear Power Operations
700 Galleria Parkway
Atlanta, Georgia 30339-5957

NRC FORM 366 (7-2001) U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB NO. 3150-0104 EXPIRES 7-31-2004

Estimated burden per response to comply with this mandatory information collection request: 50 hours. Reported lessons learned are incorporated into the licensing process and fed back to industry. Send comments regarding burden estimate to the Records Management Branch (T-6 E6), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to bjs1@nrc.gov, and to the Desk Officer, Office of Information and Regulatory Affairs, NEOB-10202 (3150-0104), Office of Management and Budget, Washington, DC 20503. If a means used to impose information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.

LICENSEE EVENT REPORT (LER)

(See reverse for required number of digits/characters for each block)

1. FACILITY NAME	2. DOCKET NUMBER	3. PAGE
Sequoyah Nuclear Plant (SQN) UNIT 2	05000328	1 OF 8

4. TITLE

Reactor Trip Resulting From A Neutral Over-Current Condition On The 2B Hotwell Pump and a Failure to Perform a Technical Specification Required Action

5. EVENT DATE			6. LER NUMBER			7. REPORT DATE			8. OTHER FACILITIES INVOLVED	
MO	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REV NO	MO	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
										05000
03	10	2003	2003	– 004 –	00	05	07	2003	FACILITY NAME	DOCKET NUMBER 05000

9. OPERATING MODE	1	11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check all that apply)			
		[redacted]	[redacted]	50.73(a)(2)(ii)(B)	50.73(a)(2)(ix)(A)
10. POWER LEVEL	088	20.2201(d)	20.2203(a)(4)	50.73(a)(2)(iii)	50.73(a)(2)(x)
		[redacted]	[redacted]	X [redacted]	
		20.2203(a)(2)(i)	50.36(c)(1)(ii)(A)	50.73(a)(2)(v)(A)	73.71(a)(5)
		20.2203(a)(2)(ii)	50.36(c)(2)	50.73(a)(2)(v)(B)	OTHER Specify in Abstract below or in NRC Form 366A
		[redacted]	[redacted]	50.73([redacted]	
		[redacted]		50.73(	

12. LICENSEE CONTACT FOR THIS LER

NAME	TELEPHONE NUMBER (Include Area Code)
James Proffitt	(423) 843-6651

13. COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT

CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX
X	AB	MO	W120	Y					

14. SUPPLEMENTAL REPORT EXPECTED			15. EXPECTED SUBMISSION DATE	MONTH	DAY	YEAR
YES (If yes, complete EXPECTED SUBMISSION DATE)	X	NO				

16. ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines)

On March 10, 2003, at 0918 Eastern standard time (EST), Operations personnel manually tripped the reactor because of a low condensate pressure and the loss of the 2A main feedwater pump (MFP). The event began with the loss of the 2B hotwell pump (HWP) causing the condensate pressure to drop. Subsequently the No. 7 heater drain tank (HDT) pumps tripped off because of a low HDT level resulting from the HDT outlet valve being secured at approximately 60 percent open for maintenance. The 2A MFP and the 2A and 2C HWPs tripped followed by Operations personnel initiating a manual reactor trip. Control room operators responded to the event in accordance with plant procedures. They promptly diagnosed the plant condition, took the actions necessary to stabilize the unit, and maintained the unit in hot standby, Mode 3. The cause of this event was an inappropriate prioritization of the work order to repair the No. 7 HDT outlet valve coincident with the electrical failure of the 2B HWP motor resulting in low and unstable condensate system pressure. The 2B HWP motor was replaced and returned to service. The No. 7 HDT outlet valve was repaired and returned to service. Following the reactor trip, dose equivalent Iodine (DEI) was determined to have exceeded the technical specification (TS) limits. TS require sampling of the reactor coolant system (RCS) for DEI every 4 hours until the activity is within limits. During a review of the TS required actions, it was determined that one of the samples was not taken within the required frequency. The RCS was subsequently sampled and the DEI was determined to be within limits.

LICENSEE EVENT REPORT (LER)

FACILITY NAME (1)	DOCKET	LER NUMBER (6)			PAGE (3)
		YEAR	SEQUENTIAL NUMBER	REVISION	
Sequoyah Nuclear Plant (SQN) Unit 2	05000328	2003 --	004 --	00	2 OF 8

NARRATIVE (If more space is required, use additional copies of NRC Form 366A) (17)

I. PLANT CONDITION(S)

Unit 2 was in power operation at approximately 100 percent reactor power.

II. DESCRIPTION OF EVENT

A. Event:

On March 10, 2003, at 0918 Eastern standard time (EST), Operations personnel manually tripped the reactor because of a low condensate pressure and the loss of the 2A main feedwater pump (MFP). The event began with the loss of the 2B hotwell pump (HWP) (EIIS Code SD) because of a neutral over-current condition on the 2B HWP motor. Loss of the 2B HWP caused the condensate demineralizer pumps discharge pressure to drop. Both No. 7 heater drain tank (HDT) pumps tripped off because of a low No. 7 HDT level. The loss of the No. 7 HDT pumps was caused by the HDT outlet valve being secured at approximately 60 percent open for maintenance concurrent with the decrease in condensate pressure as a result of the loss of the 2B HWP. Operations personnel initiated a unit downpower. The unit was at approximately 88 percent reactor load and 81 percent turbine load when the 2A MFP tripped on a loss of seal injection water. The loss of the MFP above 80 percent turbine load initiated a balance of plant runback. The 2A and 2C HWPs tripped followed by Operations personnel initiating a manual reactor trip. A feedwater (EIIS Code SJ) isolation and auxiliary feedwater (EIIS BA) start occurred, as designed. Control room operators responded to the event in accordance with plant procedures. They promptly diagnosed the plant condition, took the actions necessary to stabilize the unit, and maintained the unit in hot standby, Mode 3.

Following the reactor trip, Chemistry personnel sampled the reactor coolant system (RCS) (EIIS Code AB) and determined the Dose Equivalent Iodine (DEI) exceeded Technical Specification (TS) Limiting Condition for Operation (LCO) 3.4.8 limits. With the specific activity of the reactor coolant system (RCS) greater than 0.35 microcuries per gram DEI, TS requires the primary coolant to be sampled once every four hours until the primary coolant is restored to within its limits. The sample taken at 1855 EST on March 10, 2003, was determined to be 0.43 microcuries per gram. After shift turnover, the next sample was taken at 0030 EST on March 11, 2003, and the DEI was determined to be 0.29 microcuries per gram. This sample was not taken within the TS action frequency requirement.

LICENSEE EVENT REPORT (LER)

FACILITY NAME (1)	DOCKET	LER NUMBER (6)			PAGE (3)
		YEAR	SEQUENTIAL NUMBER	REVISION	
Sequoyah Nuclear Plant (SQN) Unit 2	05000328	2003 --	004 --	00	3 OF 8

NARRATIVE (If more space is required, use additional copies of NRC Form 366A) (17)

B. Inoperable Structures, Components, or Systems that Contributed to the Event:

For the reactor trip, the No.7 HDT outlet valve controller was inoperable and was secured at to approximately 60 percent open. With the outlet valve secured open, a low No. 7 HDT level occurred. The low tank level caused the No. 7 HDT pumps to automatically trip resulting in an additional decrease in condensate pressure. This subsequently resulted in the loss of a MFP.

C. Dates and Approximate Times of Major Occurrences:

March 10, 2003 at 0903 EST	The 2B HWP tripped on a neutral over-current condition on the motor causing a drop in condensate pressure.
March 10, 2003 at 0911 EST	The No. 7 HDT pumps tripped and the main feedwater pump seal injection pressure low alarm annunciated.
March 10, 2003 at 0913 EST	Operations initiated a turbine load reduction and the condensate booster pump suction pressure low alarm annunciated.
March 10, 2003 at 0915 EST	Operations increased the turbine load reduction to a rate of 5 percent per minute.
March 10, 2003 at 0918 EST	The 2A MFP tripped resulting in the initiation of a signal tripping the 2A and 2C HWPs. Operations personnel initiated a manual reactor trip. The reactor trip initiated a turbine trip and the 2B MFP tripped on a loss of injection water.
March 10, 2003 at 0920 EST	Operations personnel broke condenser vacuum by shutting down the vacuum pumps and closed the main steam isolation valves.
March 10, 2003 at 1220 EST	Chemistry personnel sampled the RCS, determined the DEI exceeded the TS limit, and that the RCS should be sampled every four hours until RCS activity was within the TS limit. Operations entered LCO 3.4.8 Action a

March 10, 2003 at 1620 EST	Chemistry personnel sampled the RCS and determined that the DEI still exceeded the TS limit.
March 10, 2003 at 1855 EST	Chemistry personnel sampled the RCS and determined the DEI still exceeded the TS limit.
March 11, 2003 at 0030 EST	Chemistry personnel sampled the RCS and determined the DEI to be 0.29 microcuries per gram, within the TS limit.

D. Other Systems or Secondary Functions Affected:

Two episodes of waterhammer occurred following the trip. One in the first hour following the trip, and another that occurred approximately three and a half hours later. The focal point of the first water hammer appears to have been in or near the main feedwater pump turbine (MFPT) condensers and adjacent piping and the second water hammer occurred in the bypass piping around the condensate demineralizer booster pumps.

First waterhammer event: Following loss of the 2A main feedwater pump and manual reactor trip at, a water hammer condition developed in the MFPT condensers and adjacent piping. At the initial onset of waterhammer, there was ongoing leakage of high pressure steam into both MFPT and condensers due to some expected leakage of the high pressure (HP) steam stop valves. Normally with HWPs in service this expected steam inleakage is condensed by condensate flow through the MFPT condenser condensate isolation valve bypass lines. However, due to the loss of all three HWPs the MFPT condenser cooling was lost. With no condensate flow through the tubes of the MFPT condenser, the water trapped in the tubes continued to increase in temperature beyond the boiling point for the given pressure. The waterhammer subsided somewhat following isolation of the high pressure steam by closure of the manual isolation valves upstream of the high pressure stop valves on each turbine. Pressure in the MFPT condenser was reduced to near zero following isolation of the high pressure steam. The condensate temperature increased and the pressure decreased just upstream of the MFPT condenser. The condensate inside the MFPT condenser tubes boiled and once the expanding steam bubbles reached the cooler condensate, rapid collapse of the steam occurred and resulted in the waterhammer.

Second waterhammer event occurred because of the absence of forced flow from the HWPs, the hot water present in the condensate system began to slowly cool, however much of the water in the system was at temperatures elevated well above atmospheric

boiling point. As Operations personnel continued to secure and realign the secondary plant, a drop in the condensate system pressure occurred. This resulted in renewed boiling and subsequent collapse of steam bubbles inside the condensate piping that produced the second waterhammer. As this waterhammer episode progressed, opening and closing of the check valve in the bypass piping around the condensate demineralizer booster pumps was observed. Subsequent closure of the flow control valve just upstream of the check valve halted the waterhammer. System realignments resulting in system pressure changes and movement of high temperature water by gravity draining produced the second waterhammer event.

No systems were affected by the failure to sample the RCS within the required timeframe.

E. Method of Discovery:

The 2B HWP trip was observed by operators monitoring the main control room panels. The missed action to sample the RCS and determined the DEI was identified by the Nuclear Assurance organization performing an oversight of the plant's response to the reactor trip.

F. Operator Actions:

Control room operators responded to the event in accordance with plant procedures. They promptly diagnosed the plant condition, took the actions necessary to stabilize the unit, and maintained the unit in hot standby, Mode 3.

Chemistry personnel had already sampled the RCS and determined the DEI was within the required limits, therefore, no additional actions were required.

G. Safety System Responses:

The plant safety systems responded to the reactor and turbine trips, as designed.

No response was required for the missed action to sample the RCS for activity.

III. CAUSE OF THE EVENT

A. Immediate Cause:

The immediate cause of the reactor trip was a low condensate pressure upon loss of the 2B HWP coincident with the No. 7 HDT outlet valve being secured in the open position.

The immediate cause of failing to sample the RCS and determined the DEI was that the on-coming Chemistry Shift Supervisor believed the sample frequency for RCS activity was 4 to 6 hours.

B. Root Cause:

The root cause of the reactor trip was an inappropriate prioritization of the work order to repair the No. 7 HDT outlet valve. The plant operational risks associated with the off-normal condition of the No. 7 HDT outlet valve secured at approximately 60 percent open were not understood or recognized.

The root cause of failing to sample the RCS and determine the DEI, as required by LCO 3.4.8 Action a, was that the on-coming Chemistry Shift Supervisor did not verify his initial assumptions of having up to 6 hours to obtain the sample. Operation was in the process of performing an RCS leakage determination when it was time for Chemistry to sample the RCS and determine the DEI. Because the sampling of the RCS affects the RCS leakage determination, the Chemistry Shift Supervisor reschedule the time for sampling the RCS until the RCS leakage determination was completed. It should be pointed out that LCO 3.4.8 Action b allows 2 to 6 hours to sample the RCS and perform an isotopic analysis following a thermal power change exceeding 15 percent of the rated thermal power.

C. Contributing Factor:

A contributing factor that exacerbated the decision making process when determining the work priority was the subsequent failure of a containment isolation valve, with a short LCO timeframe and the perceived risk reduction of securing the No. 7 HDT outlet valve open, that stopped the secondary side swings that were occurring as a result of problems with the outlet valve controller.

A contributing factor to the failure to sample and determine the DEI of the RCS within the required frequency was a narrow turnover scope of not specifically tracking the sampling frequency relative to the TS action.

IV. ANALYSIS OF THE EVENT

The plant safety systems responses during and after the unit trip were bounded by the responses described in the Final Safety Analysis Report (FSAR). Because of the secondary side transient 5 minutes before the reactor trip, RCS pressure increased to a maximum of 2271 psig. RCS pressure was restored to within normal operating limits approximately 34

minutes following the trip. As a precautionary measure, Operations personnel opened the pressurizer power operated relief valves (PORVs) block valves. When the block valves were opened, one of the pressurizer PORVs popped open for about 2 seconds, because of the flashing of water to steam, of the condensate between the block valve and the PORV. The pressurizer safety valves did not actuate during this event. RCS pressure remained within FSAR and TS analysis requirements and responded as expected for the conditions during the event.

For failure to sample and determine the DEI of the RCS within the required frequency, the subsequent sample demonstrated that the RCS activity was within the TS limits.

V. ASSESSMENT OF SAFETY CONSEQUENCES

Based on the above Analysis of The Event, this event did not adversely affect the health and safety of plant personnel or the general public.

VI. CORRECTIVE ACTIONS

A. Immediate Corrective Actions:

Troubleshooting of the 2B HWP motor was performed and it was determined that a ground existed on the motor winding.

As a result of the water hammer events, the secondary side of the plant was inspected and identified equipment deficiencies were corrected, as warranted.

Shift personnel involved on the event were provided with coaching and counseling to ensure he understands his role in questioning and verifying his assumptions related to timed monitoring of sampling frequencies.

B. Corrective Actions to Prevent Recurrence:

The 2B HWP motor was replaced and was returned to service. The No. 7 HDT outlet valve was repaired and returned to service.

The plant procedure for emergent plant issues is being strengthened to provide better guidance to determine the operational risk significance of abnormal plant alignments, and to provide expectations on its use.

Appropriate plant procedures are being revised to include a note to contact Chemistry before starting a surveillance that affects sampling of the RCS.

The procedure for monitoring conditional LCO actions was revised to maintain a margin to the frequency for performing an LCO action, where applicable.

Operations management has reinforced the need of Operations personnel to be aware of error likely situations and to maintain proper focus on the operation of the unit and to ensure their understanding of their role in ensuring the LCO actions for other departments are monitored in the LCO tracking log.

VII. ADDITIONAL INFORMATION

A. Failed Components:

The failed HWP motor is a Hitachi, type VEFLUN, Form KK, 1200 revolutions per minute, 6600 volts, 1250 horsepower, vertical motor. The failure was a ground that was caused by a broken pipe on the air pressure adjusting unit in the upper oil reservoir. The air pressure adjusting unit fell into and shorted the stator winding.

B. Previous LERs on Similar Events:

A review of previous reportable events for the past three years did not identify any similar events, associated with a failure of a HWP. However, it should be noted that LER 50-327/ 2002-002-00 included an event where Operations failed to perform a TS required action within the required frequency. The cause was determined to be that the supervisor was focused on restoring the diesel generator and off-site power to normal alignment and failed to assign the appropriate attention to TS LCO actions. Counseling the responsible individuals concerning the missed actions was performed. There are no other actions or causes that would have mitigated or prevented the missed sampling requirement.

C. Additional Information:

None

D. Safety System Functional Failure:

This event did not result in a safety system functional failure in accordance with 10 CFR 50.73(a)(2)(v).

VIII. COMMITMENTS

None.